

Knowledge brokerage platforms

LINKED WP 2 literature review

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1 Summary

The Norwegian Centre for ICT in Education, NCIE, carried out a literature review on evaluations of knowledge brokerage platforms during April 2010. The aim of the review is to collect experience from use of systems used in other knowledge brokerage initiatives, which can be leveraged in the specification of the functional requirements for the platform to be designed in the LINKED project.

The literature search process revealed sparse information on evaluations of knowledge brokerage platforms *per se*. NCIE hoped to find reports from studies of specific platforms with regard to functionality, information architecture, user interface design, knowledge retrieval mechanisms etc., but extensive searches in scientific journal databases and more open web search processes provided few results.

NCIE used the online search service X-port, which is provided by the University of Oslo Library. This is the largest research library in Norway, providing access to approximately 40.000 scientific journals and approximately 700 databases. In addition, the project group carried out search procedures using Google Scholar.

The main body of relevant articles found in the literature review concerned two overall topics: knowledge brokerage initiatives and concepts concerning evidence-based policy and practice. The identification of knowledge brokerage initiatives can be used in the project as a starting point for specifying functional requirements for the LINKED project. Concerning the literature on evidence-based policy and practice, we found that the bulk of the discussions in these articles are already closed in the LINKED project, meaning that they are part of the premises of the project. The project is established in recognition of the need for evidence-based policy and practice; the aim of the project is to bridge the gap between research, policy-making, and practice. Moreover, the basic mechanism for knowledge brokering in LINKED is decided – a web portal providing results of literature reviews on specific topics within the field of ICT in education.

Therefore, a substantial part of articles found in our literature review do not help move the LINKED project forward. We do not regard discussions on theoretical models for knowledge diffusion, for example, as productive for the LINKED project at its current stage. But one conclusion to be drawn from these studies is that they indicate that the foundation of the LINKED project itself is sound. Overall the conclusion is a confirmation of the approach for creating a basis for evidence-based policy-making and practice chosen in the project.

2 The search process

The search process started with three sets of keywords, using the search service X-port provided by the library at the University of Oslo¹. X-port provides access to approximately 40.000 scientific journals and approximately 700 databases.

The main part of the search process was carried out in three iterations. The two first sets of keywords represents the most specific searches. Based on the results from these, we found it necessary to broaden the search using a more general set of keywords. In addition to the three main iterations, references in the most relevant articles were pursued. Articles for further study was selected based on their titles and abstracts. Searches were also carried out using Google Scholar.

In the following, we present the quantitative results from the three sets of keywords. There are some duplicate results, as some articles were found in more than one database and some occur in more than one set of keywords.

Set I: “knowledge brokerage mechanisms”

- 30 articles from JSTOR
- 8 articles from Sociological abstracts (CSA)
- 4 articles from ‘ISI web of knowledge’
- 2 articles from Medline
- 2 articles from PubMed
- 2 articles from EMBASE (Ovid)

Set II: “knowledge brokerage initiatives”

- 29 articles from JSTOR
- 3 articles from Sociological abstracts

Set III: “knowledge brokerage”

Search within ‘scientific journals’:

- 30 articles from JSTOR
- 29 articles from EconLit (Ovid)
- 28 articles from the Sociological abstracts (CSA)
- 28 articles from ‘ISI web of knowledge’
- 5 articles from ArticleFirst (OCLC)
- 4 from the Periodicals index online

Search within ‘psychology and educational research’:

- 30 articles from Sociological Abstracts
- 16 articles from PsycINFO (Ovid)
- 11 articles from ERIC (Ovid)
- 11 articles from MEDLINE (Ovid)
- 8 articles from EMBASE (Ovid)

¹ <http://www.ub.uio.no/english/index.html>

3 Findings

3.1 Knowledge brokerage initiatives

This section provides a description of six central knowledge brokerage initiatives: The Research Evidence in Education Library (EPPI-Centre)² in the UK, the What Works Clearinghouse³ in the US, Education Counts⁴ in New Zealand, the Danish Clearinghouse for Educational Research⁵, the Campbell Collaboration⁶, and the Cochrane Library⁷. The four first initiatives are concerned with educational research, which is also one of several fields included in the Campbell Collaboration. The Cochrane Library contains systematic reviews in health care.

3.1.1 The Research Evidence in Education Library (EPPI-Centre)

The EPPI-Centre conducts systematic reviews of research evidence across a range of different topic areas and provides support for others who are undertaking systematic reviews or using research evidence. Currently they have a large number of systematic reviews in the fields of education including *Initial Teacher Education* (ITE), *Health Promotion* and *Public Health*. The knowledge brokerage system offers two ways to access the findings of reviews:

The Knowledge Pages enable access to the key messages about a specific subject area, e.g. obesity. These key messages are drawn from the total knowledge base within the EPPI-Centre and may come from multiple reviews.

The Reviews Search page provides a facility for searching the body of reviews available to date or browsing the full list of titles currently available. One can access the main findings, technical summary or full technical report of individual EPPI-Centre Reviews.

3.1.2 What Works Clearinghouse

The What Works Clearinghouse (WWC) was established in 2002 by the U.S. Department of Education's Institute of Education Sciences (IES). The mission of the WWC is to be a central and trusted source of scientific evidence for what works in education. By reviewing and synthesizing scientific evidence, the WWC is fulfilling part of IES's overall mission to bring "rigorous and relevant research, evaluation and statistics to the US education system".

The WWC generates a wide range of products. *Intervention reports* assess all studies of a specific intervention within a topic area, rating each of them based on the WWC evidence standards. *Topic reports* compile the information from intervention reports in a topic area and enable WWC users to easily compare the ratings of effectiveness and sizes of effects for numerous interventions in one area. WWC *quick reviews* are designed to provide education practitioners and policymakers with timely and objective assessments of the quality of the

² <http://eppi.ioe.ac.uk>

³ <http://ies.ed.gov/ncee/wwc/>

⁴ <http://www.educationcounts.govt.nz/>

⁵ <http://www.dpu.dk/site.aspx?p=9882>

⁶ <http://www.campbellcollaboration.org>

⁷ <http://www.thecochranelibrary.com>

research evidence for recently released research papers and reports. Finally, based on reviews of research and the expert opinions and experiences of a panel of nationally recognized experts, *practice guides* contain practical recommendations for educators to address challenges in their classrooms and schools.

3.1.3 Education Counts

The Education Counts knowledge brokerage initiative was established by the New Zealand Ministry of Education. The goal of Education Counts is to increase the availability and accessibility of information about education statistics and research. Education Counts can be considered a 'one-stop shop' for such information, including:

- demographic information, specifically tailored for use in the education sector
- contextual information, such as labour market information, for assisting with the interpretation and understanding of education information
- reference lists, including address and service details of New Zealand's education institutions
- statistical information, various collections of statistical information obtained through Ministry of Education processes, including data on achievement, participation, and resourcing
- analysis of education information, including education sector indicators and detailed examination of key education themes
- publications, such as research and evaluation, Iterative Best Evidence Synthesis, regular monitoring reports, and specialised analysis
- pathways to other Ministry of Education, and Ministry sponsored, websites
- technical info to support the use and interpretation of data and information, including data dictionaries, glossaries, and descriptions of analytical techniques.

3.1.4 The Danish Clearinghouse for Educational Research

The Danish Clearinghouse for Educational Research creates an overview of the current best knowledge of good educational practice and communicates it to practitioners and politicians. The clearinghouse's main product is the systematic research review. In addition, they provide an international evidence base – a database of systematic reviews in the field of education. The reviews are produced by a number of different organisations worldwide.

3.1.5 Campbell Collaboration

The Campbell Collaboration (C2) helps people make well-informed decisions by preparing, maintaining and disseminating systematic reviews in education, crime and justice, and social welfare.

The Campbell Collaboration is an international research network that produces systematic reviews of the effects of social interventions. Campbell is based on voluntary cooperation among researchers of a variety of backgrounds.

Campbell currently has five Coordinating Groups: Social Welfare, Crime and Justice, Education, Methods, and the Users group. The Coordinating Groups are

responsible for the production, scientific merit, and relevance of the systematic reviews. They provide editorial services and support to review authors.

3.1.6 Cochrane Library

The Cochrane Library is a collection of six databases that contain different types of high-quality, independent evidence to inform healthcare decision-making, and a seventh database that provides information about groups in The Cochrane Collaboration. The Cochrane Database of Systematic Reviews (CDSR) is a resource for systematic reviews in health care. The CDSR includes all Cochrane Reviews (and protocols) prepared by Cochrane Review Groups in The Cochrane Collaboration. Each Cochrane Review is a peer-reviewed systematic review that has been prepared and supervised by a Cochrane Review Group (editorial team)

3.2 Knowledge brokerage platforms

The literature review provided sparse results on evaluations of knowledge brokerage platforms. One reflection, however, is found in the article “Social Science and Evidence-based Everything: the case of education” (Oakley, 2002, pp 278-279). In the context of discussing the EPPI-Centre, Ann Oakley states:

“However, we in education have the opportunity to benefit from the experiences of the Cochrane Collaboration in sponsoring systematic reviews of health care. One example of what we hope *not* happen in educational research synthesis can be illustrated by a recent enquiry about what is known about the best way to treat the epidemic of head lice in schoolchildren. Most Internet search engines will locate a large number of different sites relating to this topic, and many of these give contradictory advice. The Cochrane Library does have a recently updated review of interventions to treat head lice (Dodd, 2002), and this is superior to most Internet offerings in providing a systematic account of where the information included in it has been taken from, and how it has been quality assessed. The head lice treatment review is 45 pages long, examines 70 studies, dismisses 67 of them as being of unsound quality and makes detailed recommendations for future research needs. But the review is full of technical language and, having read the review as a user of health care, one is not much nearer knowing what one ought to do to treat a child with head lice than one was at the beginning.” (Oakley, 2002, pp. 278-279)

We should note that both the EPPI-Centre and the Cochrane Collaboration are significantly more complex and comprehensive than what we aim for in LINKED.

In this article, Oakley also presents a vision for the knowledge brokerage platform:

“The vision at the end of this work is REEL—The Research Evidence in Education Library. This is an electronic database of completed reviews of educational research evidence— and the hope is that it will be available in every school and educational institution in the country, and that it will be user-friendly and relevant to the needs and interests of a large range of stakeholders in the education process.” (Ibid, p. 278).

Title	Social Science and Evidence-based Everything: the case of education
Author	Oakley, A.
Abstract	Recent moves in academic and policy circles to strengthen the social science research evidence base have raised questions about the

quality and status of educational research. They have suggested a need for systematic research synthesis, for greater accessibility of sound educational research evidence, and greater respect for the perspectives of the different stakeholders in the educational research process. This paper looks at the background to 'the evidence movement', and discusses a particular government-funded initiative designed to take forward the challenge of systematic reviews of educational research. It considers some of the ways in which this activity poses challenges for social science methodology.

Reference (Oakley, 2002)

3.3 Evidence-based policy and practice

The ESRC UK Centre for Evidence Based Policy and Practice⁸ has published a series of working papers⁹ on evidence-based policy and practice in the broad field of social and public policy. These papers are useful in examining approaches to knowledge brokering, with emphasis on systematic reviews as a foundation. In general, these working papers substantiate the approach taken in LINKED. They do not address evaluations of knowledge brokerage platforms, but might serve as a knowledge base for further development of the LINKED initiative in the future. Two examples of the working paper series are presented in the following.

Title	Systematic reviews: what have they got to offer evidence based policy and practice?
Authors	Boaz, A; Ashby, D; Young, K.
Abstract	Contributes to the debate on extending the use of systematic reviews to a wider range of policy areas. Examines ways in which systematic review presents a distinctive approach to synthesising research, exploring the challenges faced by researchers outside clinical medicine and identifying reasons why it is sometimes contentious in the social policy and practice field. Areas in which the social sciences can contribute to the development of review methodology are outlined. The wider impact of systematic review activity on the quality of primary research is also discussed, together with the tools and training resources available to support this activity.
Reference	(Boaz, Ashby, & Young, 2002)

Title	Evidence Based Policy and Practice: Cross Sector Lessons From the UK
Authors	Nutley, S; Davies, H; Walter, I.

⁸ <http://kcl.ac.uk/schools/sspp/interdisciplinary/evidence/>

⁹ <http://kcl.ac.uk/schools/sspp/interdisciplinary/evidence/publications/>

Abstract	Draws out some of the key lessons to have emerged from trying to ensure that policy and practice are better informed by evidence, focusing on four requirements for improving evidence use: agreement on what counts as evidence in what circumstances; a strategic approach to the creation of evidence in priority areas, with systematic efforts to accumulate robust bodies of knowledge; effective dissemination of evidence to where it is most needed, and the development of effective means of providing wide access to knowledge; and initiatives to ensure the integration of evidence into policy and encourage the utilisation of evidence in practice. Looks at how these issues have been approached in the UK, with comment on a range of public sector initiatives.
Reference	(Nutley, Davies, & Walter, 2002)

In the context of educational research, there are several articles on evidence-based policy and practice from the EPPI-Centre. The article *Research Evidence, Knowledge Management and Educational Practice: early lessons from a systematic approach* (Oakly, 2003) discusses the EPPI-Centre initiative with respect to three challenges: The Review Process, political, and technical. It does not discuss the technical knowledge brokerage platform.

Title	Research Evidence, Knowledge Management and Educational Practice: early lessons from a systematic approach
Author	Oakly, A.
Abstract	'Evidence-informed' education is part of a general move internationally to found policy and practice on a more reliable scientific base. This paper describes a five-year initiative in this area funded by the English Department for Education and Skills in 2000. The paper describes the background to the initiative, the infrastructure developed within it for supporting research synthesis, and some of the challenges experienced by the first review groups.
Reference	(Oakly, 2003)

In the article *Opportunities and Challenges of Using Systematic Reviews of Research for Evidence-based Policy in Education*, Harlen and Crick discuss issues related to systematic reviews with respect to the specification of the review question, the selection of studies of various designs, the criteria for evaluating research and the identification of implications for users of research in education.

Title	Opportunities and Challenges of Using Systematic Reviews of Research for Evidence-based Policy in Education
Authors	Harlen, W; Crick, R.D.

Abstract	In this paper we discuss the potential for using systematic reviews of research to inform policy in education against the background of severe criticisms of the quality and relevance of individual research studies, most recently by the Commission on the Social Sciences. The potential is set against the reality of conducting systematic reviews of research, following the procedures of the EPPI-Centre. The issues raised and discussed relate to: the specification of the review question, the selection of studies of various designs, the criteria for evaluating research and the identification of implications for users of research in education. The chief obstacles to more effective use of educational research are identified as the different discourses of researchers, practitioners and policy makers; obstacles that only genuinely closer working and mutual understanding of difference priorities, timescales and discourses can address.
Reference	(Harlen & Crick, 2004)

The article *Is the evidence-based practice movement doing more good than harm? Reflections on Iain Chalmers' case for research-based policy making and practice* by Hammersley is a more critical examination of the concept of evidence-based policy and practice.

Title	Is the evidence-based practice movement doing more good than harm? Reflections on Iain Chalmers' case for research-based policy making and practice.
Author	Hammersley, M.
Abstract	Powerful voices are currently insisting that policy and practice must be based on research evidence, and that social science inquiry should be reformed in order to serve this need more effectively. An influential figure in the evidence-based practice movement is Sir Iain Chalmers, previously director of the UK Cochrane Centre. Taking evidence-based medicine as his model, he presents the task of research as to determine which policies and practices work. This is to be achieved through the use of randomised controlled trials and systematic reviews of their results. In this article, some of the central assumptions of his case are assessed.
Reference	(Hammersley, 2005)

3.4 Learning Object Brokerage

In the course of our literature review we found a number of articles pertaining to knowledge brokerage of learning objects. A learning object is a resource, usually digital and web-based, that can be used and re-used to support learning. Learning objects are used by learners in their learning activities. Discussions on learning objects are outside the scope of this study, but we find the topic of mechanisms for brokering learning objects relevant. This is a more mature

domain for knowledge brokering, even though both the content and the target groups are different from what we are concerned with in LINKED.

One important reason for including learning object brokerage in this study is that the volume of content is considerable, resulting in a requirement for sophisticated mechanisms for navigation, user adaptation, and retrieval. The issues discussed in the examples provided below is probably beyond what we should aim for in this phase of LINKED, but they can serve as an inspiration for further development of the LINKED brokerage platform.

Title	Sharing Digital Resources in Teacher Education: an Ontology-based Approach
Author	Alvino, A; Bocconi, S; Boytchev, P; Earp, J; Sarti, L.
Abstract	Teacher Education (TE) is a dynamic, lifelong process that needs to fully embrace innovation and assume a broader European perspective. The EC-funded Share.TEC project aims to provide enhanced, culturally-aware access to TE-related resources across Europe by means of a federated resource brokerage system whose semantic core is the proposed Teacher Education Ontology (TEO). This paper describes the rationale for an ontology-driven approach, gives an overview of TEO's multi-layered structure for addressing multicultural and multilingual issues, and presents some aspects of the TEO implementation that allow for language-independent conceptualization and multidimensional issues, and presents some aspects of the TEO implementation that allow for language-independent conceptualization and multidimensional hierarchical searching and filtering. Other TEO features are also discussed, including the support for dynamically generated user interface and system stability against ontology modifications.
Reference	(Alvino, Bocconi, Boytchev, Earp, & Sarti, 2009)

Title	A Multimedia Broker to Support Accessible and Mobile Learning Through Learning Objects Adaptation
Author	Salomoni, P; Mirri, S; Ferretti, S; Roccetti, M.
Abstract	The large diffusion of e-learning technologies represents a great opportunity for underserved segments of population. This is particularly true for people with disabilities for whom digital barriers should be overstepped with the aim of reengaging them back into society to education. In essence, before a mass of learners can be engaged in a collective educational process, each single member should be put in the position to enjoy accessible and customized educational experiences, regardless of the wide diversity of their personal characteristics and technological equipment. To respond to this demand, we developed LOT (Learning Object

	Transcoder), a distributed PHP-based service-oriented system designed to deliver flexible and customized educational services for a multitude of learners, each with his/her own diverse preferences and needs. The main novelty of LOT amounts to a broking service able to manage the transcoding activities needed to convert multimedia digital material into the form which better fits a given student profile. Transcoding activities are performed based on the use of Web service technologies. Experimental results gathered from several field trials with LOT have confirmed the viability of our approach.
Reference	(Salomoni, Mirri, Ferretti, & Roccetti, 2008)

Title	Developing a Brokering Architecture for Multimedia Learning Objects on the Semantic Web
Author	Fiaidhi, J; Mohammed, S; Hahn, M.
Abstract	The World Wide Web is changing. While once conceived of and implemented as a collection of static pages for browsing, it now promises to become a web of services – a dynamic aggregate of interactive, automated, and intelligent services that interoperate via the Internet. For the web of services model to succeed, techniques which match service requestors with service providers must be developed. In particular, such techniques are especially important for highly demanding applications such as e- Learning. Such educational applications developed for the Semantic Web require some kind of reasoning capability. Providing sound and complete reasoning services is essential for many of these applications to function properly. In this paper, we present a Multimedia Learning Object Brokering Architecture implemented using Apache Axis, Jena and Pellet. The Broker component determines which MLOs satisfy a query based upon information contained in one or more domain-specific ontologies. The system's requestor and provider components are designed specifically for use with SVG slideshow presentations described using the CanCore standard. All queries are expressed in OWL-OQL, a concise OWL query language created for use with our brokering system.
Reference	(Fiaidhi, Mohammed, & Hahn, 2007)

Conclusion

The literature search process resulted in very modest findings on the primary aim of the study: Evaluations of knowledge brokerage platforms. The most important result of the study for the LINKED project at its current stage might be the identification of other knowledge brokerage initiatives. We suggest that these serve as inspirations for the functional requirement specification for the LINKED platform, where the entire LINKED project team comments on both the strong and weak sides of these platforms.

There is a significant amount of literature on the concept of evidence-based policy and practice. The bulk of discussions found in this literature goes back to the foundation of LINKED, and generally substantiate the approach taken in the project. However, we believe that the articles on systematic reviews might provide a basis for further development of the LINKED initiative in the future.

A few examples of articles on knowledge brokerage of learning objects are also included in this report. This might be marginal in terms of the scope of our work, but they are included for inspiration on possible further developments in LINKED. The requirements for sophisticated mechanisms for navigation, user adaptation, and retrieval of information might be more relevant for LINKED if the content base grows substantially more complex than we envision in the current phase of the project.

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